

WHAT IS CLAIMED IS:

1. An apparatus for controlling the temperature of at least one electronic device, said apparatus comprising:

5 a flow loop through which refrigerant fluid is conducted to alternately absorb and release thermal energy;

a thermal head connected into said flow loop for engaging said electronic device;

10 a base structure including a mount portion to which said thermal head is mounted, said base structure defining at least part of said flow loop so as to route said refrigerant fluid to and from said thermal head; and

15 said base structure including an isolation arrangement normally maintaining said mount portion in planar alignment with said base structure but permitting movement of said mount portion to facilitate engagement of said thermal head with said electronic device.

20 2. An apparatus as set forth in claim 1, wherein said isolation arrangement includes at least one flexible arm defining a flow passage for said refrigerant fluid.

25 3. An apparatus as set forth in claim 2, wherein said isolation arrangement has a plurality of flexible arms, two of said plurality defining respective first and second flow passages.

30 4. An apparatus as set forth in claim 3, wherein said plurality of flexible arms comprises a total of three flexible arms supporting said mount portion.

5. An apparatus as set forth in claim 2, wherein said flexible arm defines two parallel flow passages for ingress and egress of refrigerant fluid to and from said thermal head, respectively.

5 6. An apparatus as set forth in claim 1, wherein base structure has a generally planar configuration, said mount portion and said isolation arrangement being formed by configured slots defined in said base structure.

10 7. An apparatus as set forth in claim 6, wherein said base structure comprises a plurality of generally planar layers juxtaposed to one another.

15 8. An apparatus as set forth in claim 7, wherein said base structure has an intermediate layer sandwiched between top and bottom layers.

9. An apparatus as set forth in claim 8, wherein said intermediate layer defines flow passages forming said at least part of said flow loop.

20 10. An apparatus as set forth in claim 6, wherein said base structure comprises two layers juxtaposed to one another, at least one of said two layers having grooves defining flow passages forming said at least part of said flow loop.

25 11. An apparatus as set forth in claim 1, wherein said flow loop circulates said refrigerant fluid in a refrigeration system including a compressor and a condenser such that said refrigerant fluid will change between gaseous and liquid states to alternately absorb and release thermal energy.

30 12. An apparatus as set forth in claim 1, further comprising a valve located on said base

structure, said valve operative to control flow of said refrigerant fluid into said thermal head.

13. An apparatus as set forth in claim 12, wherein said valve is attached to said mount portion.

5 14. An apparatus as set forth in claim 12, wherein said valve is formed by a pinch point configured in a flow passage of said base structure.

15 15. An apparatus as set forth in claim 1, further comprising a controllable mechanism operative to move said thermal head into engagement with said electronic device.

16. An apparatus as set forth in claim 15, wherein said controllable mechanism is actuated by a source of pressurized gas.

15 17. An apparatus as set forth in claim 1, wherein said base structure has a plurality of mount portions adapted to carry a respective thermal head, each of said mount portions being supported by a respective isolation arrangement.

20 18. An apparatus as set forth in claim 1, wherein said isolation arrangement comprises a planar spring.

25 19. An apparatus for controlling the temperature of a plurality of electronic devices, said apparatus comprising:

 a plurality of thermal heads;

 a base structure having a plurality of planar springs supporting respective of said thermal heads; and

30 each of said planar springs being movable to facilitate movement of a respective thermal head into

engagement with a corresponding said electronic device.

20. An apparatus as set forth in claim 19, further comprising a controllable mechanism operative to move said thermal heads into engagement with respective of said electronic devices.

21. An apparatus as set forth in claim 20, wherein said controllable mechanism is actuated by a source of pressurized gas.

22. An apparatus as set forth in claim 21, wherein said controllable mechanism comprises a semirigid bladder which pushes said thermal heads into engagement with respective of said electronic devices.

23. An apparatus as set forth in claim 22, further including respective valves mounted to said base structure and associated with each of said thermal heads, said semirigid bladder engaging said valves to push said thermal heads into engagement with said electronic devices.

24. An apparatus as set forth in claim 19, wherein said base structure is configured as a manifold defining flow passages for routing refrigerant fluid to and from said thermal heads.

25. An apparatus as set forth in 24, wherein said base structure comprises a plurality of generally planar layers juxtaposed to one another.

26. An apparatus as set forth in claim 25, wherein said base structure has an intermediate layer sandwiched between top and bottom layers, said intermediate layer defining said flow passages.

27. An apparatus as set forth in claim 25, wherein said base structure comprises two layers juxtaposed top one another, at least one of said two layers having grooves defining said flow passages.

5 28. An apparatus as set forth in claim 19, wherein each said planar spring includes at least one flexible arm defining a flow passage for said refrigerant fluid.

10 29. An apparatus as set forth in claim 28, wherein each said planar spring includes a plurality of flexible arms, two of said plurality defining respective first and second flow passages.

15 30. An apparatus as set forth in claim 29, wherein said plurality of flexible arms comprises a total of three flexible arms.

31. An apparatus as set forth in claim 30, wherein said flexible arm defines two parallel flow passages for ingress and egress of refrigerant fluid to and from said thermal head, respectively.

20 32. An apparatus as set forth in claim 19, wherein said planar springs are each formed by configured slots defined in said base structure.

33. An apparatus comprising:

25 a generally planar base structure defining a mount portion to which a thermal head is mounted, said mount portion being supported by an isolation arrangement;

30 said isolation arrangement being configured to permit movement of said thermal head between retracted and extended positions; and

 said isolation arrangement being formed by configured slots defined in said base structure.

34. An apparatus as set forth in claim 33, further comprising a controllable mechanism operative to move said thermal head into engagement with an electronic device.

5 35. An apparatus as set forth in claim 34, wherein said controllable mechanism is actuated by a source of pressurized gas.

36. An apparatus as set forth in claim 33, wherein said base structure is configured as a manifold defining flow passages for routing
10 refrigerant fluid to and from said thermal head.

37. An apparatus as set forth in 35, wherein said base structure comprises a plurality of generally planar layers juxtaposed to one another.

15 38. An apparatus as set forth in claim 36, wherein said base structure has an intermediate layer sandwiched between top and bottom layers, said intermediate layer defining said flow passages.

39. An apparatus as set forth in claim 36, wherein said base structure comprises two layers juxtaposed top one another, at least one of said two
20 layers having grooves defining said flow passages.

40. An apparatus comprising:

25 a generally planar base structure defining a mount portion to which a thermal head is mounted, said mount portion being supported by an isolation arrangement;

30 said isolation arrangement being configured to permit movement of said thermal head between retracted and extended positions; and

said isolation arrangement including at least one flexible arm defining a flow passage for conducting refrigerant fluid.

5 41. An apparatus as set forth in claim 40, wherein each said isolation arrangement includes a plurality of flexible arms, two of said plurality defining respective first and second flow passages.

10 42. An apparatus as set forth in claim 41, wherein said plurality of flexible arms comprises a total of three flexible arms supporting said mount portion.

15 43. An apparatus as set forth in claim 40, wherein said flexible arm defines two parallel flow passages for ingress and egress of refrigerant fluid to and from said thermal head, respectively.

 44. An apparatus as set forth in claim 40, wherein said base structure comprises a plurality of generally planar layers juxtaposed to one another.

20 45. An apparatus as set forth in claim 44, wherein said mount portion and said isolation arrangement are formed by configured slots defined in said base structure.